
Preliminary Observations on the Northern Blossom-Bat *Macroglossus minimus* in Captivity

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Introduction

The Northern Blossom-bat *Macroglossus minimus* (Geoffroy, 1810) is a small, (head-body length, 59-64 mm; weight, 11-19 g) nectar and pollen feeding bat, found in northern Australia from the Kimberleys to northern Cape York. Its extralimital distribution includes New Guinea, the Bismarcks and the Solomon Islands (McKean 1983) and much of northern Indonesia. Originally described from Australia by Ogilby in 1892 as *M. australis*, the first specimen was collected from the Murray Islands in Torres Strait. Australian forms have since been placed in *M. minimus*, originally described from Java (Geoffroy 1810). Currently four subspecies are recognised, the sub-species occurring in Australia being *M. m. pygmaeus* Anderson (Anderson 1911).

M. m. pygmaeus is now considered a common species in the "Top End" of the Northern Territory, associated with monsoon forests, paperbark swamps, bamboo thickets, dense riverine vegetation and mangroves (Kitchener *et al.* 1981; Thomson 1991). By day, these bats appear to roost alone, although reported sightings are few. These include roosts in bamboo thickets and the rolled-up young leaves of bananas (McKean 1983). Outside Australia the bats have been found roosting alone, or in small groups under the canopies of large leaved trees and palms, and beneath roofs of uninhabited buildings (Flannery 1990).

Up to November 1991 a total of 13 *M. minimus* individuals have been kept at the Territory Wildlife Park, Berry Springs, Northern Territory. Six wild bats (3 males, 3 females) were caught during February 1988 and October 1989. They were trapped using Monofilament mistnets (mesh size c. 25 mm) in the early evening beside a paperbark swamp, and on the fringe of a monsoonal vine forest, within the Wildlife Park. After capture these bats were held temporarily at the Holding Block, before being moved to the Nocturnal House. Five individuals have been bred in captivity (4 males and 1 female). This paper, describing observations of these captive individuals from 1989 to 1990, represents the first account of the captive maintenance and breeding of this species.

Methods

Individual bats were marked for identification using size 04 alloy bat bands (Australian Bird & Bat Banding Scheme). The bats were on display in the Nocturnal House in an exhibit measuring about 5 x 1.5 m and was 2 m high.



PLATE 3 Blossom Bat at inflorescence of banana (I. Morris)

It was vegetated with small paperbarks (*Melaleuca* species) and many other live native shrubs, vines and grasses. Day light was simulated for 11 hours (21:00 - 10:00) using metal halide lights. These also provided the vegetation with a broad enough light spectrum to facilitate growth. From 10:00 to 21:00 "moon light" was simulated by 8 watt fluorescent lights with blue tinted gels. Public viewing was from 10:00 - 18:00.

The exhibit required relatively low maintenance. However, live vegetation needed to be fertilised on a regular basis, usually every 4-8 weeks, with an organic liquid fertiliser (e.g. "Maxicrop" Hortico). Trimming and training of the vines and pruning of the shrubs was necessary as the plants tended to grow up towards the light source giving an unnatural appearance. Grass tussocks and leaf litter had to be replenished on a regular basis. The bats did no damage to the exhibit, but their faeces were deposited on the glass regularly, and had to be cleaned off daily.

Food

As the common name implies, Northern Blossom-bats feed mainly on blossoms, collecting nectar and pollen with their long narrow tongues. Records of stomach

contents include some insects, but these are believed to be ingested accidentally (McKean 1983). Rate of passage is swift, with food passing completely through the gut in 30 minutes or less as in other Pteropodidae (Nelson 1989). In the wild, feeding usually commences at dusk. When feeding they either hang directly on the foliage, or hover near the blossoms just long enough to probe with their long thin tongues (Thomson 1991).

At the Territory Wildlife Park the provided food consisted of an artificial nectar mix, used by Taronga Zoo, Sydney (Woodside) for Queensland Blossom-bats *Syconycteris australis*. This consisted of a blend of 2 small bananas plus apple juice to make up 500 ml. To this mix was added 15 tablespoons of raw sugar (CSR), 6 tablespoons of High Protein Baby Cereal (Heinz) and 6 tablespoons of Infasoy (Wyeth Pharmaceuticals). When the above ingredients were well-blended, an equal volume of water was added. Daily rations were packaged separately in clip-seal bags and frozen. Approximately 20 ml was provided in each nectar feeder (Birdland UK), using one feeder per bat, plus one extra. The feeders were placed in a manner so that no one individual could monopolise the feeding area. This helped to ensure that young bats learning to feed were not harassed. Some feeders were hung in view of the public to give them the opportunity to observe the bats feeding at close quarters; their tongues can be seen lapping up the mix. The bats were fed at about 09:00 hours each morning after feeders from the previous day were removed.

The diet was supplemented occasionally with flowering branches of local plants; including species of *Melaleuca*, *Grevillea*, and *Eucalyptus*, availability and time permitting. Locally, these bats have been observed feeding on the flowers of exotic plants, such as bananas (I. Morris, pers. comm.). A nectar feeder of water was also supplied in the exhibit although the bats were seldom observed drinking from this feeder. Once the feeders with nectar were placed in the exhibit in the morning, the exhibit was sprayed with water, to help maintain the humidity. At this time, the bats were observed licking water droplets from foliage.

Reproduction

Breeding behaviour of the Northern Blossom-bat has not been described. It was known that births occur in the dry season, during August and September, from information from dissections of a few females (McKean 1983). However, recent observations suggest that they may well be polyoestrus. Births occur all year round in New Guinea (McKean 1983), and captive births at the Wildlife Park have occurred in February, March, April, October and December (Webber pers. obs.). When trapped, adult males showed marked variation in scrotal development, and the development of a V-shaped gland on the chest. This sternal gland is absent in females and juvenile males. The males produced a pungent and musky odour which is thought to originate from this gland.

Of the seven Blossom-bats displayed in the Nocturnal House, three (1 male: #683; 2 female: #686, #688) were adults when caught in the wild (the remaining four were

first generation captive bred). At capture, one female (#686) had quite large nipples indicating that she had most probably bred and suckled young previously, while the other female (#688) was thought to be sub-adult as nipples were not enlarged. The latter female was thought to be pregnant at time of capture, but no birth occurred. Attempts at mating were observed on several occasions. Each time the female was hanging and the male landed as close as possible to her, approached upside-down, and mounted her quickly. Copulation was swift, within about 10-15 seconds. Subsequently the male flew off and groomed his penis after settling.

Both females produced young in captivity. Prior to parturition, the females switched from regular roost sites to ones much lower in the exhibit and regularly groomed and licked the lower abdomen. After they had given birth the female usually returned to her previously preferred roost site. Female #686 gave birth to three males, one on each of the 30 April 1990, 11 December 1990 and 25 March 1991; #688 to one female on 21 October 1990. New born young had a fine covering of hair on their head and back; their bellies were bare, and muzzle short relative to adults. The eyes were closed and the ears were down flat against the head. The lateral margins of the outer ear were quite darkly pigmented, fading with maturation. They were almost always suckling on the mother's teat. Keepers observed juveniles hanging by themselves at 6-10 days for a short period. A hovering behaviour was observed in females with young prior to the young learning to fly. The dam hovered just out of reach of the young bat while the latter was hanging. This was observed in young between 11-30 days old.

Captive young could fly quite well by 40 days, but hung on the dam whilst at roost as long as possible. One six-month old male still hung on his dam on a regular basis. One female had her previous offspring hang on her from time to time throughout her pregnancy. Both the new born bat and this sub-adult were observed hanging from the dam simultaneously. At the time of writing, only one of the captive bred offspring has begun to show any sign of sexual maturation. At approximately 210 days old, the male born on 30 April 1990 started showing development of a sternal gland, followed by very slight scrotal development. It is quite possible that this development could be influenced by having to share the enclosure with several adults.

Vocalisation was not heard as frequently as in other captive Pteropids, possibly because of their small size or more solitary nature. Vocalisation usually occurs during fighting and in the more cantankerous individuals during handling. Young, separated from their dam, use a distinctive call apparently in distress which evokes an immediate response in the female both vocally and physically. She will call and try to reach the young bat. Independent sub-adult bats have been heard to give the juvenile distress call if harassed.

Discussion

The captive care, maintenance and breeding of the Northern Blossom-bat has been relatively uncomplicated. Four fatalities have occurred - two of these shortly after

capture, and the loss of a female and her newborn young a day after the birth. The causes of these deaths are uncertain. Stress would probably have been a major factor in the newly-caught specimens. Captive Queensland Blossom-bats have experienced a number of postpartum problems and resulting deaths (J. Webber, pers. obs.). To date no illness in the bats, or any problems with either endoparasites or ectoparasites have been observed. The only injuries have been minor ones associated with the forearm alloy bands. Once the bands were removed the injuries healed quickly.

The scope for further captive study of this species is large. Further observations of this group will provide data on age of sexual maturity, age of weaning and more comprehensive data on growth rates and maturation. That the species occurs naturally within the Park is an advantage and will enable collection of data on the wild population in the future.

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